west virginia department of environmental protection

Division of Air Quality
601 57th Street, SE
Charleston, WV 25304-2345
Phone: 304 926 0475 • Fax: 304 926 0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION/FACT SHEET

B ACKGROUND INFORMATION

Application No.:	R13-3249
Plant ID No.:	103-00006
Applicant:	Dominion Transmission, Inc.
Facility Name:	Hastings Compressor Station
Location:	Pine Grove
NAICS Code:	486210
Application Type:	Modification
Received Date:	March 26, 2015
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	$3,500.00
Date Received:	March 30, 2015
Complete Date:	May 6, 2015
Due Date:	August 4, 2015
Applicant Ad Date:	April 1, 2015
Newspaper:	Wetzel Chronicle
UTM's:	Easting: 528.62 km Northing: 4,377.66 km Zone: 17
Description:	The application is for the replacement of existing production gas dehydration unit with an enclosed combustion device.

FACILITY DESCRIPTION

The Hastings Compressor Station is located off Route 20 in Pine Grove, Wetzel County, WV. The facility receives gas from nearby well sites and provides compression and dehydration of the gas. Hastings Compressor Station is classified as a production facility in its construction permit. The Title V operating permit for the site is aggregated with the nearby Mockingbird Hill Compressor Station and the Lewis-Wetzel Compressor Station. The existing source consist of the following:

• Two (2) Cooper GMXE-6 engines each rated at 500 hp;

• One (1) Generac QT080 Auxiliary Generator rated at 128 hp (80 kW);

• One (1) NATCO Dehydration Unit rated at 7.5 MMscf/day;

• One (1) NATCO Reboiler rated at 0.38 MMBtu/hr;

• One (1) NATCO Heater rated at 10.0 MMBtu/hr;

• One (1) Dehydration Unit Flare rate at 73 scf/min; and

• Four (4) Tanks of various sizes for the storage of fluids.

The proposed modification would include the decommissioning of the NATCO Dehydration Unit, the NATCO Reboiler, and the Dehydration Unit Flare. To replace these units, Dominion is seeking approval to install:

• One (1) Integral Dehydration Unit rated at 7.5 MMscf/day;

• One (1) Diverse Energy Systems Reboiler rated at 0.55 MMBtu/hr; and

• One (1) Questor Technologies Q50 Enclosed Combustion Device.

DESCRIPTION OF PROCESS

The wet gas is first routed through an absorber, which uses lean glycol to remove water from the gas. Dry gas from the absorber leaves the station via pipeline. Rich glycol from the absorber flows to an uncontrolled flash gas tank and then to a heat exchanger. The exchanger transfers heat from both the flashed glycol and the Reboiler Heater (RB02) to the lean and makeup glycol stream. The flashed glycol continues to the Regenerator, which separates the overheads (moisture and any absorbed hydrocarbons) from the glycol. Overheads are released as off gas from the Dehy Unit and routed to the Enclosed Combustion Device (DEHY1) for incineration. Glycol leaving the Regenerator is pumped and returned to the absorber after passing through the heat exchanger.

SITE INSPECTION

The Hastings Compressor Station is a major source and subject to the Operating Permit Program of Title V. Thus, the facility is regularly inspected to ensure compliance with this air program. The facility was last inspected by Mr. James Jarrett, P.E., a compliance engineer assigned to the Compliance & Enforcement Section, on February25, 2014. Mr. Jarrett found the facility to be operating in compliance with the facility Title V Operating Permit.

ESTIMATE OF EMISSION BY REVIEWING ENGINEER

Emissions associated with this modification application consist of an enclosed combustion device, glycol dehydrator still vent, glycol dehydrator reboiler and fugitive emissions components. The following table indicates which methodology was used in the emissions determination:

Table #1 List of Estimation Methods Used		
Emission Unit ID#	**Process Equipment**	**Calculation Methodology**
004-02	Dehydration Unit Still Vent	GRI-GlyCalc 4.0
DHEY1	Questor Technologies Q50 ECD	EPA AP-42 Emission Factors & GRI-GylCalC 4.0
005-06	Reboiler	AP-42 Emission Factors

The applicant used a recent gas analysis from a gas sample taken at the inlet of the existing dehydration unit to predict emission from the dehydration unit. This predicted gas composition was entered into Glycalc to predict the emissions from the dehydration unit's emission points which are the still vent of the regenerator and gas outlet of the flash gas separator (tank). This particular dehydration unit configuration will route the off gas from the flash tank as fuel for the enclosed combustion device and the effluent from the still vent. The gas analysis was entered in on a dry basis and assumed to be saturated with water based on temperature and pressure of the incoming gas using the software. The writer reproduced the GYLCalc Run using the water content noted in the gas analysis, which was 80 lb of water per MMscf of gas.

The dehydration modeled was configured as a 7.5 MMscf/day at 300 psig unit using a flash tank and dry gas as the stripping gas. The emission source that has the greatest potential for hazardous air pollutants (HAPs) from the TEG dehydration unit is the still vent. One potentially applicable regulation, which will be discussed later in this evaluation, has an exclusion limit for TEG dehydration unit's with potential benzene emissions less than 1 ton per year. Because the flash tank and still vents are being controlled by the enclosed combustion device, the benzene emissions are being combined with the toluene, ethylbenzene, and xylene emissions as BTEX emissions.

Table #2 Hourly Streams from Dehydrator to DEHY1						
	Volatile Organic Compounds (lb/hr)		Total HAPs (lb/hr)		BTEX (lb/hr)	
	Flash Tank Vent	Still Vent	Flash Tank Vent	Still Vent	Flash Tank Vent	Still Vent
Applicant's	1.86	25.43	0.06	3.67	0.01	3.21
Applicant's plus 20%	2.23	30.52	0.07	4.40	0.01	3.85
Writer's Run	0.72	16..61	0.02	1.68	<0.01	1.39

BTEX – Benzene, Toluene, Ethylbenzene, and Xylene, which are all classified as HAPs.

Both of these streams are routed to the enclosed combustion device. The applicant configured GLYCalc to predicted these stream being vented to a control device that has a minimum destruction efficiency of 95%. Applicant had provided information that indicates that the proposed control device is capable of achieving 98% destruction efficiency in accordance with 40 CFR §60.18. Thus, the writer agrees with the applicant's proposed means of estimating VOCs, Total HAPs, and BTEX from the enclosed combustion device.

The applicant used AP-42 to account for the combustion related emissions from the enclosed combustion device.

Table #3 – Emissions from the DEHY1		
Source	DEHY1	
Pollutant	Hourly Rates (lb/hr)	Annual (tpy)
$PM/PM_{10}/PM_{2.5}$	0.01	0.04
Oxides of Nitrogen (NO_x)	0.05	0.22
Carbon Monoxide (CO)	0.04	0.18
Sulfur Dioxide (SO_2)	0.001	0.004
Volatile Organic Compounds (VOCs)	1.65	7.23
Total Hazardous Air Pollutants (HAPs)	0.22	0.96
Carbon Dioxide Equivalent (CO_2e)	234.20	1,025.80

The writer re-estimated the CO and NO_x from the enclosed combustion device using emission factors published in RG-360A/11 dated February 2012 by the Texas Commission on Environmental Quality. The writer selected the low Btu emission factors after modeling the still vent and flash tank off gas using ProMax 3.2 by Bryan Research & Engineering Inc. A 2-phase separator was used to represent a knock-out pot then it was mixed with the flash tank off gas. The Net ideal gas heating value of this stream was determined to be 769 Btu/hr, which is less

than 1000 Btu/ft^3. According this guidance, the stream is a low Btu stream. The selected emission factors were for non-assisted flare combusting a low Btu gas stream. Questor Technology Inc. has specified a maximum heat input of 2.0 MMBtu/hr for the Q50 enclosed combustion device, which was used in the following estimation. The CO emissions were predicted to be 1.10 pounds per hour and 4.82 tpy. NO_x emissions were predicted to be 0.28 pounds per hour and 1.2 tpy.

Based on the GLYCalc results and fuel properties from ProMax, the total heat input from the still vent and flash tank streams is 861,679 Btu/hr, which equates to CO and NO_x emissions rates of 0.47 and 0.06 pounds per hour.

The reboiler is using fuel from pipeline TL-420, which is pipeline quality natural gas. Thus, the use of emission factors from AP-42 is appropriate for estimating emissions from the reboiler.

Table #4 – Emissions from the Reboiler		
Source	Reboiler	
Pollutant	Hourly Rates (lb/hr)	Annual (tpy)
$PM/PM_{10}/PM_{2.5}$	0.004	0.02
Oxides of Nitrogen (NO_x)	0.054	0.24
Carbon Monoxide (CO)	0.05	0.22
Sulfur Dioxide (SO_2)	0.0003	0.001
Volatile Organic Compounds (VOCs)	0.003	0.01
Total Hazardous Air Pollutants (HAPs)	0.007	0.03
Carbon Dioxide Equivalent (CO_2e)	64.40	282.07

The following table lists the potential emission after controls from this proposed new dehydration unit.

Table #5 Potential Emissions From the Modification			
Pollutant	Annual (tpy)	PSD Significance Level (tpy)	PSD Triggered
$PM/PM_{10}/PM_{2.5}$	0.06	25/15/10	No
Oxides of Nitrogen (NO_x)	1.44	40	No
Sulfur Dioxide (SO_2)	0.002	40	No
Carbon Monoxide (CO)	5.04	100	No
Volatile Organic Compounds (VOCs)	7.24	40	No
Total Hazardous Air Pollutants (HAPs)	0.86	N/A	N/A
Carbon Dioxide Equivalent (CO_2e)	1,307.87	N/A	N/A

REGULATORY APPLICABLILITY

The proposed station will be a minor source for criteria pollutants and classified as an area source for HAPs. Benzene emissions from the dehydration unit will be less than 1 ton per year, which means that Subpart HH – National Emissions Standard for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities of Part 63 would not be applicable to the emission standards of this subpart (40 CFR §63.764(e)(1)(ii)).

45 CSR 2 & 10

The only rules that are applicable to the dehydration unit are Rules 2 & 10, which established allowable emissions for PM, visual emissions, and sulfur dioxide. These rules are focused on the reboiler portion of the dehydration unit. The proposed dehydration unit will have a design heat input of less than 10 MMBtu/hr which excludes the PM and SO_2 allowable limitations for fuel burning units from the proposed reboiler (45 CSR §2-11.1 and 45 CSR §10-10.1). Since the reboiler will be consuming a gaseous fuel with little to no ash content, the visual emission standard (10% opacity limit) should be achieved without the use of add-on controls.

The still vent and flash tank stream are considered as process gas under Rule 10 and subject to 45 CSR §10-5.1. 45 CSR §10-5.1. limits the amount of hydrogen sulfide in process gas streams to 50 grains per 100 cubic feet of gas being combusted. Typical natural gas produced in West Virginia has a low concentration of hydrogen sulfide. The hydrogen sulfide content of the produced natural gas will be measured. To correlate the future measured values to the concentration that the reboiler would see, the writer conducted several additional runs of GLYCALC to predict the concentration at the flash tank off gas by inputting values of hydrogen sulfide in the wet gas inputs (trial and error approach) with a target set at the 50 grain standard.

The results of this approach determined that incoming natural gas with a hydrogen sulfide concentration of 65 ppm (10 grains per 100 cubic feet of gas) to the proposed dehydration units would generate flash gas that has a hydrogen sulfide concentration of 48 grains per 100 cubic feet of gas.

45 CSR 6

The enclosed combustion device is an incinerator and subject to 45 CSR 6 (Rule 6). Rule 6 establishes allowable PM and visual emission rates from incinerators. The allowable PM for the proposed enclosed combustion device is 0.03 pounds per hour and 20% opacity. The enclosed combustion device should operate in a smokeless mode for this application and generate little to no particulate matter. Thus, the proposed enclosed combust device should meet the emission standards of Rule 6.

Subpart HH to Part 63

Dominion elected to file this application to ensure that the proposed control device is recognized in a federally enforceable document. Thus, the potential to emit for applicability to Subpart HH of Part 63 is determined after controls. The enclosed combustion device reduces the potential to emit of Total HAPs to less than major source threshold levels according to 40 CFR §63.761, which is less than 1 tpy of total HAPs from the new dehydration unit. Therefore, the

new dehydration unit at the Hastings Compressor Station would be classified as an area source of HAPs and potentially subject to Subpart HH as an area-source.

Due to the level of control provided by the enclosed combustion device, projected actual benzene is to be less than 0.1 tpy, which is less than 1.0 tpy benzene exemption in 40 CFR §63.763(e)(ii). Therefore, this dehydration unit would be exempt from the applicable requirements of 40 CFR §63.763 in accordance with 40 CFR §63.763(e)(ii). Dominion will be required to determine actual benzene emissions in accordance with 40 CFR §63.

45CSR 13 & 14

The Hastings Compressor Station is an existing major source under 45 CSR 14. Thus, an applicability determination must be made to determine if the proposed modification represents a major modification as defined in 45 CSR §14- 2.40., which means that the project (modification) results in a significant emissions increase and a significant net emission increase. The proposed modification does not represent a significant emission increase (See Table #5). Therefore, no further review of this modification under 45 CSR 14 is necessary.

This main purpose of this application is for Dominion to make the enclosed combustion device enforceable, to avoid the requirements of Subpart HH to Part 63. Therefore, a modification permit is required to establish such requirements. Dominion prepared and submitted a complete application, paid the filing fee, and published a Class I Legal ad in the *Wetzel Chronicle* on April 1, 2015, which is required under Rule 13 for a modification permit. The facility will be an 8D source and subject to Title V. The applicant included Attachment S with this application to be processed as a Significant Modification to the Facility's Title V Operation Permit.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There will be small amounts of various non-criteria regulated pollutants emitted from the combustion of natural gas. However, due to the small concentrations emitted, detailed toxicological information is not included in this evaluation. The dehydration unit will be classified as an area-source of HAPs with a potential to emit of total HAP of less than 1 tons per year with benzene being less than 0.1 ton per year.

AIR QUALITY IMPACT ANALYSIS

The writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed modification does not meet the definition of a major modification of a major source as defined in 45CSR14.

MONITORING OF OPERATIONS

The dehydration unit needs to ensure that benzene emissions are being minimized to less than 1.0 ton per year. Subpart HH requires a source using the 1.0 ton of benzene exclusion to determine actual average benzene emissions in accordance with 40 CFR 63.772(b)(2)(i). Thus, the source with have to track actual wet gas throughput and determine benzene emission using GLYCalc Version 3.0 or higher.

Dominion provided an evaluation of the proposed control device using the performance criteria outlined in 40 CFR §60.18. Dominion determined that the heat content of the effluent to be 606.40 Btu/scf and the tip velocity to be 0.9 feet per second, which satisfies 40 CFR §§60.18(c)(3)(ii) and (c)(4)(i). The writer determined the heat content of the effluent to be 769 Btu/scf and the tip velocity of 0.32 feet per second, which satisfies the design criteria of §60.18.

Questor has rated the flow rate for the Q50 at 50,000 scf/d, which equates to 2,083 scf per hour. The maximum predicted flow rate of effluent is 1,120 scf/h, which is less than the manufacturer's rated flow rate of the device. Using ProMax, the writer predicted the maximum temperature of the enclosed combustion device at $1{,}636^{0}$F, which is within the operational range determined by the manufacturer. This evaluation of the proposed Q50 indicates that this control device has been sized correctly for the proposed application.

To ensure proper operation of the enclosed combustion device, the permittee will be required to conduct an initial visual emission observation in accordance with EPA Method 22 for 2 hours. After that initial observation, verification of proper operation will rely on conducting quarterly visible emission checks and monitoring the presence of a pilot flame. The permittee will be required to verify that the close vent system routing the effluent is being maintained in a leak free condition by conducting an initial Method 21 with annual checks using visible, audible, or olfactory methods to identify equipment leaks.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates the proposed modification of the facility will meet all the requirements of the applicable rules and regulations when operated in accordance with the permit application. Therefore, the writer recommends granting Dominion Transmission Inc. a Rule 13 Modification Permit for their Hastings Compressor Station located near Pine Grove, WV.

Edward S. Andrews, P.E.
Engineer

August 31, 2015
Date